Phone : 08819 - 246126 / 246926 website:www.svkpandksrajucollege.edu.in
S.V.K.P. & Dr. K.S. RAJU ARTS & SCIENCE COLLEGE
(Autonomous)
Recognized by UGC as "College with Potential for Excellence"
Accredited by NAAC with "A" Grade
(Affiliated to ADIKAVI NANNAYA UNIVERSITY - Recognised by Govt. of Andhra Pradesh)
PENUGONDA-534 320, West Godavari District., (A.P.)

I Semester Syllabus
BIOCHEMISTRY
(w.e.f. 2023-24 Admitted Batch)
23BSC11 INTRODUCTION TO CLASSICAL BIOLOGY

Hours/Week: 5 **Credits:4**

Unit1: Introduction to systematics, taxonomy and ecology.

1.1 Systematics– Definition and concept, Taxonomy –Definition and hierarchy.
1.2 Nomenclature– ICBN and ICZN, Binomial and trinomial nomenclature.
1.3 Ecology– Concept of ecosystem, Biodiversity and conservation.
1.4 Pollution and climate change.

Unit 2: Essentials of Botany.

2.1 The classification of plant kingdom.
2.2 Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones).
2.3 Structure of flower–Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos.
2.4 Mushroom cultivation, floriculture and landscaping.

Unit 3: Essentials of Zoology

3.1 The classification of Kingdom Animalia and Chordata**.**
3.2 Animal Physiology –Basics of Organ Systems & their functions, Hormones and Disorders
3.3 Developmental Biology –Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)
3.4 Economic Zoology –Sericulture, Apiculture, Aquaculture

Unit4: Cell biology, Genetics and Evolution

4.1 Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.
4.2 Chromosomes and heredity–Structure of chromosomes, concept of gene.
4.3 Central Dogma of Molecular Biology.
4.4 Origin of life

Unit 5: Essentials of chemistry

5.1 Definition and scope of chemistry, applications of chemistry in daily life.
5.2 Branches of chemistry

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I Semester Syllabus
BIOCHEMISTRY
(w.e.f. 2023-24 Admitted Batch)
23BSC12 INTRODUCTION TO APPLIED BIOLOGY

Hours/Week: 5 **Credits:4**

Unit 1: Essentials of Microbiology and Immunology

1.1 History and Major Milestones of Microbiology; Contributions of EdwardJenner, Louis Pasteur, Robert Koch and Joseph Lister.
1.2 Groups of Microorganisms–Structure & characteristics of Bacteria, Fungi, Archaea & Virus.
1.3 Applications of microorganisms in–Food, Agriculture, Environment and Industry.
1.4 Immune system–Immunity, types of immunity, cells and organs of immune system.

Unit 2: Essentials of Biochemistry

2.1 Biomolecules I– Carbohydrates Lipids.
2.2 Biomolecules II–Amino acids & Proteins.
2.3 Biomolecules III–Nucleicacids-DNA and RNA.
2.4 Basics of Metabolism–Anabolism and Catabolism.

Unit 3: Essentials of Biotechnology

3.1 History, scope and significance of biotechnology. Applications of Biotechnology in Plant, Animal, Industrial and Pharmaceutical sciences.
3.2 Environmental Biotechnology– Bioremediation and Biofuels, Biofertilizers and Biopesticides.
3.3 Genetic engineering– Gene manipulation using restriction enzymes and cloning vectors; Physical, chemical and biological methods of gene transfer.
3.4 Transgenic plants–Stresstolerantplants(bioticstress–BTcotton,abioticstress–salt tolerance). Transgenic animals – Animal and disease models.

Unit 4: Analytical Tools and techniques in biology– Applications

4.1 Applications in forensics–PCR and DNA fingerprinting
4.2 Immunological techniques– Immunoblotting and ELISA.
4.3 Monoclonal antibodies–Applications in diagnosis and therapy.
4.4 Eugenics and Gene therapy

Unit 5: Biostatistics and Bioinformatics

5.1 Data collection and sampling. Measures of central tendency –Mean, Median, Mode.
5.2 Measures of dispersion– range, standard deviation and variance. Probability and tests of significance.
5.3 Introduction, Genomics, Proteomics, types of Biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment
5.4 Accessing Nucleic Acid and Protein databases, NCBI Genome Workbench

5.3 Chemical bonds–ionic, covalent, non-covalent– Vander Waals, hydrophobic, hydrogen

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II Semester Syllabus
BIOCHEMISTRY HONOURS (23BC21 MAJOR/MINOR)
(w.e.f. 2023-24 Admitted Batch)
BIOMOLECULES

Hours/week-3 **Credits-3**

UNIT-I

Fundamentals of Biochemistry: History, scope and avenues of Biochemistry. Water as a biological solvent. Measurement of PH, Buffers, Biological relevance of Buffers. Outlines of surface tension, adsorption and osmosis and their biological relevance.

UNIT-II

Carbohydrates: Classification, monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation. Reactions of carbohydrates (due to functional groups - hydroxyl, aldehyde and ketone. Amino sugars, Glycosides. Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose). Structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen). Glycosaminoglycans.

UNIT– III

Lipids Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids. Prostaglandins-structure, types and biological role. Lipoproteins-types and functions

UNIT-IV

Amino Acids and Proteins Classification, structure, stereochemistry, chemical reactions of amino acids due to carbonyl and amino groups. 2. Titration curve of glycine and pK values. Essential and non essential aminoacids, non-protein aminoacids.3.Peptide bond –nature and conformation. Naturally occurring peptides - glutathione, enkephalin. 4. Proteins: Classification based on solubility, shape, and function. Determination of amino acid composition of proteins. 5. General properties of proteins, denaturation, and renaturation of proteins. 6. Structural organization of proteins- primary, secondary, tertiary, and quaternary structures (Eg. Hemoglobin and Myoglobin).

UNIT-V

Nucleicacids and porphyrins, Types of RNA and DNA. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphor diester linkages.2.Effect of acids, alkali and nucleases on DNA and RNA. 3. Structure of Nucleic acids- Watson-Crick DNA double helix structure, denaturation and renaturation of nucleic acids, Tm-values and their significance, cot curves and their significance. 4. Structure and properties of porphyrins: Heme, cytochromes and chlorophylls.

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II Semester Syllabus
BIOCHEMISTRY (w.e.f.2023-24AdmittedBatch)
23BC22 CELL BIOLOGY

UNIT-I

ProkaryoticandEukaryoticcells:CellorganellesStructure,Compositionand functions of nucleus, mitochondria plastids, endoplasmic reticulum, Golgi, lysosomes, vacuole, micro bodies, ribosomes, cytoskeleton.

UNIT-II

Cell division: mitosis**,** meiosis**,** cell cycle and its regulation, different phases of cell cycle. Apoptosis, Regulation ofcell cycle, Cyclins, MPF, Cyclin dependent kinases, Growthfactors, Nuclear Laminins, inhibition of cell cycle progression, MPF and progression to Metaphase, Proteolysis and MPF, Regulation of MPF activity. Check points in cell cycle regulation.

UNIT-III

Cell communication: general principles of cell communication, cell adhesion and roles of different adhesion molecules, cell junction/gap junctions, extracellular matrix, integrins. Signaltransduction:Cellsurfacereceptor,G-proteincoupledreceptors,signaltransduction pathways, second messengers, regulation of signalling pathways, bacterial and plant two component systems, bacterial chemotaxis, and quorum sensing.

UNIT-IV

Protein Sorting and Targeting: Overall pathway of synthesis of nuclear coded, secretory, lysosoma land membrane proteins. Import across ER – Signal hypothesis, post translational modifications of secretory/membrane proteins in ER, sorting of lysosomal proteins, Mannose
-6-Phosphatereceptors,synthesis,trafficking,and localization of mitochondrial proteins. Protein traffic into and out of nucleus.

UNIT-V

Bio membranes: Chemical composition of Membranes, Composition of plasma and organelle membranes of animal and plant cells. Lipids, proteins and Carbohydrates of membranes Distribution of membrane lipids. Assembly of membrane components. Molecular structure of membranes: Miscelle and liposomes, biological membrane; Symmetry of the membrane; Membrane fluidity; fluid mosaic model of biological membranes. Nanomaterials and their applications.
MembraneTransport:Donnanmembraneequilibrium,Diffusionacrosscellularmembranes Mediated transport; Energetics of transport systems; Passive transport anion exchange proteins; Active transport; Active transport of Na^+ K^+ (Sodium potassium ATPase) Ca^{2+} (Ca^{2+}-ATPase). Active transport ofsugars coupled to Phosphorylation; grouptranslocation (Y-Glutamyl cycle).Proton motive force in bacterial transport processes. Ionophores Gap junctions; Endocytosis, Exocytosis.Nature of receptors.